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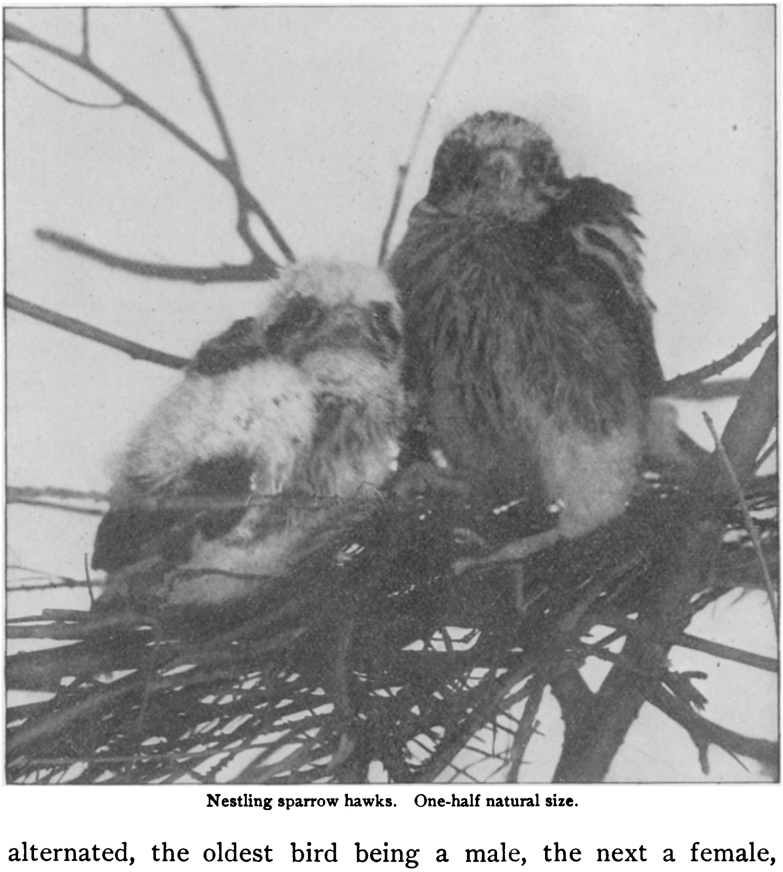
ON THE ALTERNATION OF SEX IN A BROOD OF YOUNG SPARROW HAWKS.

DR. R. W. SHUFELDT, C.M.Z.S.

IN the early part of May (1898) a collector sent me a brood of five nestling sparrow hawks (*Falco sparverius*), taken from their nest in the neighborhood of Washington, D. C. At the time of reception they were in excellent health and vigor, and all readily fed from the hand bits of raw beef that were offered to them. The quantity of such food each one could eat at a single meal, and the rapidity with which it was digested, were both remarkable facts. A pound and a half of beef was equally divided among them within a quarter of an hour, and was disposed of without any apparent inconvenience to them. Having kept them five or six days in a small basket in which an improvised nest had been made, it was noted with surprise that this temporary habitation remained unsoiled by their excrement, which, however, was by no means the case with the floor for nearly a yard from the edge of the basket, and upon the walls of the corner of the room where the basket was kept, up for nearly an equal distance. In this particular, nestling raptorial birds are at marked variance with such groups as the Passeres and the Woodpeckers, for example, where the parents habitually carry away the excrement of their young, and drop it at a distance from the nest. On or about the sixth day I made a series of photographs of these young hawks, taking them singly, and in one instance two of them together, after which my son chloroformed the five and made a very excellent series of skins of them. Upon dissection and a study of this series a number of interesting points were brought to light. It was noted in the first place that the largest bird of the brood, and of course the oldest one, was nearly double the size of the youngest or last one of the series, while the three others graduated down, from the largest to the smallest, in almost exact proportions. It was evident, then, that the female had laid the eggs at regular intervals, and very likely three or four days apart, and that incubation commenced immediately after the first egg was deposited. What is more worthy of note, however, is the fact that the sexes of these nestlings alternated, the oldest bird being a male, the next a female, followed by another male, and so on; the last or youngest one of all five being a male. This last had a plumage of pure white down, with the pinfeathers of the primaries and secondaries of the wings, as well as the rectrices of the tail, just beginning to open at their extremities. From this stage gradual development of the plumage is exhibited throughout the series, the entire plumage of the males and the females being very different and



Nestling sparrow hawks. One-half natural size.

distinctive. It would be interesting to ascertain if this is always the case among the *Falconidæ*, or was only accidental in the present instance. Prof. Alfred Newton, in his *Dictionary of Birds*, page 634, says that owls often begin brooding as soon as the first egg is laid; "but, if my observation is not mistaken, the habit is not constant, even with the same individual bird"; and he adds, by way of explanation, that this "practice unquestionably has its advantages, since the offspring, being of different ages, thereby become less of a burden on the parents which have to minister to their wants, while the fostering warmth of the earlier chicks can hardly fail to aid the development of those which are unhatched, during the absence of father and mother in search of food; but most birds, and, it need scarcely be said, all those the young of which run from their birth, await the completion of the clutch before sitting is begun."

Bendire, in his account of this falcon in his *Life Histories of North American Birds*, says positively that the eggs "are deposited at intervals of a day," but he has nothing to say about the alternation of the sexes in the brood. It is a well-known fact that the eggs of the sparrow hawk vary greatly in form as well as in their ground color and markings. As to this last, it may largely depend, as I have pointed out in my *Comparative Oölogy of North American Birds*, "upon the physical condition of the parent bird at the time of depositing the egg." [1]

If it be true that the sexes alternate in broods of young sparrow hawks, as a regular thing, the present writer has no explanation for the fact, nor has he ever heard of one as having been advanced by any other observer, and it is more than probable that it will be a long time before science will be in possession of the correct interpretation.

In the reproduction of my photograph illustrating this paper, both the birds in the picture are *females*, they being the oldest and the youngest of that sex of the five; in other words, they represent birds numbers two and four of the brood. In order to photograph them I was obliged to build up the little platform of twigs, seen in the figure, for them to rest upon, as neither of them could steady itself by holding on to a small branch, — at least, the younger one could not, and its sister could do so only for a short time, — while the oldest bird of this brood could perch well. Sparrow hawks usually build their nests in the hollows of old trees, but occasionally they utilize the abandoned nests of other species.

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[1] *Report of U. S. National Museum*, p. 476, 1892. This memoir is now entirely out of print.